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Journal of the Society of Arts.

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FRIDAY, JANUARY 5, 1866.

Announcements by the Council.

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Ordinary Meetings.

Wednesday Evenings, at Eight o'clock:—

January 17.—"On Automatic Telegraphy." By Alexander Bain, Esq.

January 24.—"On the Uses of National Museums to Local Institutions." By Lord Henry G. Lennox, M.P.

Cantor Lectures.

The concluding Lectures of the Course by G. W. Hastings, Esq., LL.D., will be delivered as follows:—

Lecture III.—Monday, January 15th.—"On Copyright and Trade Marks."

Lecture IV.—Monday, January 22nd.—"On Limited Liability."

The lectures commence each evening at Eight o'clock, and are open to Members, each of whom has the privilege of introducing one Friend to each Lecture.

The tickets already issued will be available on these evenings.

Peat as Fuel.

The sum of £50 placed in the hands of the Council by J. Bailey Denton, Esq., to which is added the Society's Gold Medal, is offered for the production of a fuel from Peat, which shall be equal in quality to good household coal for ordinary purposes, and capable of being sold in the market commercially at less cost than such coal. The attainment of this object must be demonstrated practically and on a commercial scale.

Prizes to Art-Workmen.

The works of which a list was given in the last *Journal* are now placed in the Society's library, for the inspection of members and their friends. The following is an addition to the works sent in to compete for the Prizes offered by the Worshipful Company of Plasterers:—

61a. Truss or Bracket, in terra cotta, by "Nil Desperandum."

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

THE CATTLE PLAGUE IN THE LAST CENTURY.

The following is a reprint of the article[*] on this subject referred to in the chairman's address at the opening of this session:—

After the best methods of breeding and feeding cattle, the next great object of improvement in pastoral agriculture is, the preserving them from mortal diseases; but especially from those which, in consequence of general causes, seize and carry off great numbers together. The more lax and tender habit of sheep subjects them constantly, in our country, to such a distemper, called the rot, which seems the result of principles arising from the nature of the soil and climate, and subsists always in one part or other, though with various degrees of extensiveness, according to various circumstances of place and season. But the neat cattle, being of a stronger and more hardy constitution, are not ordinarily disposed, with us, to any disorders that attack and destroy great numbers at the same time, and from the effects of the same principle. There is, however, a disease incidental to beasts of this kind, which, propagating itself by infection, raging, at times, in most countries in Europe, and carrying such destruction wherever it comes, that it may truly be deemed a pestilence of the cattle, has, in its turn, visited our island, and made us experimentally sensible of its dreadful consequences. It prevails with great malignity at this time on the shores of the continent opposite to us, whence some sparks of the contagion have been lately brought and kindled here, in more than one place, as is imagined. Happily, a quick extinction followed this introduction of it into our country, but there is the justest ground of apprehension from these instances, as well as from other circumstances peculiar to the present,[†] it may be again conveyed to us, and spread through the whole country, if the greatest care be not exercised to prevent the bringing it over, and to suppress it immediately in any particular place where it may be found to have been brought.

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[*] The paper is entitled "Observations on the Murrain or Pestilential Disease of Neat Cattle: the Means of Preventing the Infection, and the Medicinal Treatment of the Beasts when seized with it," and is by Mr. Robert Dossie. It is extracted from his "Memoirs of Agriculture," Vol. ii., 1771.—Ed. *J.S.A.*

[†] The prevalence of the contagion of the murrain, at this time, throughout the countries of the United Provinces, whence there seem little hopes it will be soon expelled, renders it extremely liable to be brought over to us, in consequence of the intercourse we have with those countries. It is, indeed, only under particular circumstances, as will be shown below, that the cattle, with us, is susceptible of this infection. Because, even when most diffused over our country, it extinguishes entirely of itself in favourable periods, when the general state of animals is healthful, as we have twice experienced in the present century. But the irregularities of the late seasons, and particularly the great alternations of heat and cold, the continuance of wet weather, and the frequency of easterly winds, all of which are injurious to animal strength, and, conspiring in this year, have manifestly weakened both vegetables and animals; have, consequently, rendered the cattle peculiarly susceptible of this infection, as well as mankind of those contagious distempers to which they are subject. This is not only evident from clear deductions, from demonstrable principles of physiology, but from the fact itself. There being two, if not three, instances of the contagion of the murrain having taken effect in our island, within the space of a year, in parts the most distant from each other. One was in the south, last autumn, which occasioned the issuing the orders of council that were then published, and the notice taken by his majesty in his speech at the opening the last session of Parliament. Another was far north, in Scotland, where it seems, also, to be established, on good authority, that some beasts were actually seized with this disease. The third, but not equally well vouched and ascertained to be this disorder, was in Northumberland, near Newcastle. The effects of the contagion in all these places were confined to a few beasts, and, happily, were suppressed in a very short time. But it is to be apprehended, that, from the increased disposition of the cattle to receive it, in consequence of the unfavourable circumstance of season, if the infection were again introduced, we have the most mischievous consequences to dread from it; and whoever will

This disease, so fatal to horned beasts, was formerly called, in English, the murrain, but is now more generally named the contagious disease of cattle. The name of murrain ought, however, to be resumed, because, it is well known there are other infectious distempers of cattle besides this, which might possibly subsist here at the same time; and the want of a due distinction of name would, therefore, occasion confusion in the communications and deliberations requisite to the measures for suppressing them.[*]

The destructive effects of the murrain are but too well known from the havoc made during its continuance here, with greater or less violence, for fifteen or sixteen years. But the true nature of the disease is very little understood, and even the appearances and obvious symptoms are known in any distinct manner only to very few. Considered, therefore, either in the view of promoting the interests of agriculture, or providing the means of security against a very momentous national evil, it is a matter of the very highest importance to investigate the causes of this distemper; the manner in which its contagion acts, and may be conveyed; the symptomatic appearances it exhibits; and the mode and success of the trials already made to prevent the infection, or to cure the disease; and thence to deduce the best methods of hindering the introduction of the contagion into places free from it, or the dispersion of it more extensively when introduced, and of saving, by medicinal aid, as many of the cattle, when really infected, as is practicable, with due advantage to the owner.

It is the more necessary that all material information respecting this contagious disease of cattle should be collected, and some proper plan of proceeding for its prevention and cure, thence formed and published; because nothing of this kind, so perfect as to be of any practical use, has been hitherto given to the public in any language.

Many voluntary writers, in different periods and countries, have, indeed, published treatises on this subject, and some professors of physic and academic bodies have been called upon, by the authority of government in several states, to deliver their opinions on it; but little success, as to practical utility, has resulted from the labours of either. As to medicinal means, either for the prevention of infection, or cure of the distemper, nothing offered in these works has been carried into general practice anywhere; nothing offered in them, for reasons we shall have occasion to touch on below, having been found of actual benefit, at least in the way there proposed; and as to other preventive means of excluding the contagion from places free from it, or the hindering its spreading when it has found admission, some measures very proper in their nature, have been adopted, both with us and elsewhere, but not so effectually as to the manner, as to be accounted a full security against the danger to which, as was above intimated, some unfavourable circumstances expose us, at present, in an extraordinary degree. With relation to the description of this disease, there are more than one work, which have considerable merit with learned readers. Dr. Layard's treatise, published in our own country, and Professor Camper's, published in Holland, both contain true accounts of the symptoms and appearances; but they are delivered in such technical terms and manner, as render them not clearly intelligible to any but persons acquainted with medical subjects; and consequently, not practically useful to owners of cattle in general; nor to others who may have concern with the cure or prevention of the murrain. As to the theoretic observations on the nature and process of this disease, there is nothing hitherto exhibited to the public, but references of it to the school hypotheses of the sect of each writer; or reasonings from single particulars, in which the conclusions are no way sufficiently warranted by the premises; nor correspondent, in most points, with the general phenomena.

Induced, by the importance of the subject, together with the apparent want of a more familiar description of the appearances of this distemper of horned cattle, and just account of its nature, as well as of the means of prevention and cure, as they may be thence deduced, I have here attempted to supply this deficiency[*] as far as the brevity, prescribed me by the want of greater room in this volume, would admit. The other parts may be enlarged on to advantage, and are intended to be more amply discussed in a treatise published on this subject solely; but the description of the appearances of the disease, which is at present by far the most essential of all other communications respecting it, not requiring more compass than can be afforded to it, is fully given here.

I shall, therefore, first offer some general account of the murrain, with respect to the manner and periods of its former appearance here, and in other places; the general effects of it; the susceptibility of the cattle, as to its infection; the conveyance of the contagion; and the means hitherto proposed for the prevention of the infection, and the cure of the distemper. I shall next describe the true symptoms and minute appearances of it; and, as far as can be inferred from them and other facts respecting it, explain the true nature of the disease, and point out the indications of cure. To this I shall afterwards subjoin some observations on the best method of medicinal treatment for saving such of the cattle as are curable, and the proper means of rendering effectual the plan of regulations ordained by the Government for the prevention of the contagion.

Accounts of contagious diseases of neat cattle are found in the writings of the ancients, and in those of most of the periods betwixt them and us,[†] in which the

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examine well the present orders and regulations of the government made to hinder the spreading of the contagion, will find that we can have very little dependence on them for our security against this momentous evil, as they now stand.

[*] The having a particular name for the pestilential disease of cattle here treated is the more necessary, because another contagious malady of cattle is said to have broken out lately in Italy, and is called the *cancer volant*. We have, as yet, no perspicuous account of the symptoms of that malady. But from the name, if it have any allusion at all to the similitude betwixt that disease and cancers, we must conclude it to be very different from the murrain; and as this new disease may spread itself over the other countries of Europe, and possibly reach us, it is particularly proper, at present, to keep the names distinct.

[*] While the disease was rife in this country, I endeavoured to amass all the information in my reach respecting its nature, appearances, and cure, as well from immediate observation as books. Since that time I have extended the knowledge I then collected by the communications of several able professors in the countries where this disease has more lately prevailed; and particularly by a correspondence with an ingenious physician in Holland, who has, in a particular manner, applied himself to the consideration of this subject, for which there is, at present, but too great opportunity in his neighbourhood. I presume myself thence able, not only to give a more succinct and and clear account of this disease, but also to furnish some new lights, which may lead to the obtaining a more effectual method of medicinal treatment of the diseased beasts, and likewise to the supplying those defects, and removing those difficulties, which render the provisions made by the government against the introduction of the contagion into our country of less avail at present.

[†] Among the authors who have mentioned, or treated of the contagious diseases of cattle in the earlier times, the principal are Aristotle, M. Portius Cato, Plutarch, Virgil, Livy, and Columella. Among those of the later period are Vegesius, Eginardus, Gesner, Aldrovandus, Fracastorius, Ubbo Emmius, and Outhoff. Since the year 1711, that this disease has run through all the countries of Europe, there are great numbers of Dutch, German, Danish, French and English writers on it,

state of letters has afforded an opportunity to transmit to us the passages of the times. Several of these accounts do not specify the symptoms attending on the diseases; but some describe them, though with a diversity of circumstances in some from others, and with a variation in all from the appearances now found in the murrain. Such variations of the same disease, at different times, and in different places, happen, however, in other instances; and it is, therefore, not easy to determine whether the contagious distempers of the cattle mentioned in the earlier writers, were all, or any of them, really the murrain or not. If, nevertheless, it be a matter of difficulty to ascertain this point, it is happily of as little consequence; because, as we shall see below, the means related to be used for the prevention or cure of those diseases, except the methods of hindering the conveyance of the infection, which are equally proper in all such cases, appear trivial and inefficacious; and, therefore, no practical advantage can be drawn from settling these doubts respecting the identity of the disease, as might have been, had these means proved to be more effectual.

The first clear traces we have of the later introduction of the murrain into Europe commence in the year 1710 or 1711; at which time there are authentic accounts that it was observed in Hungary. Whether it was brought thither from other countries, most probably further to the south-east, or if not, how it was originally generated there, we have no lights that lead to any certain knowledge. But it was conveyed thence into Dalmatia, and propagated through that country to the neighbourhood of Padua, whence it spread over the whole of the Venetian state. It was soon afterwards disseminated through the whole of Italy, and passed, in 1713, through the Tyrolese into Germany; whence it communicated itself to almost every other part of Europe, as far north as Denmark and Sweden, introducing itself also about that time into Great Britain. After this, in consequence of more favourable seasons, the contagion abated by degrees in all the places where it had prevailed, and in about nine years the infection seemed to be exterminated in most of them. There is reason to believe, notwithstanding, that some lurking remains kept their ground in parts where the relaxation of moist air, and the debilitating effects of putrid vapours rendered the cattle more susceptible of all contagion. For, in the beginning of the late king's reign, the disease revived here to such a degree as to give occasion to the government to make some regulations for the suppression of it, though after a short time the infection again seemed to have been extinguished. It also appears to have shown itself in some parts of Germany even to the year 1730.

In the year 1740 or 1741 this disease again broke out in the south-eastern parts of Europe, and made its progress through the same countries as in its former course after 1710.

It was brought hither in 1744 or 1745, from Holland, as is believed, and made great devastation of the cattle for several years, after which it declined considerably, but took fresh vigour in 1756, and continued to rage with considerable violence for some time. It then abated gradually, and, as far as appears, the infection, at length, was wholly lost; as for a number of years we had not the least signs of it before the autumn of the last year, and since, when it is believed to have broken out afresh in two or three places of the island, though not, as there is reason to believe, from any relics of the former, but the introduction of a new contagion brought from other countries. In the meantime, though we have been free from the murrain for a number of years, yet it has during that period visited other places. Denmark and Jutland, in particular, felt it in 1769, with greater severity than has ever been known elsewhere. The United Provinces have undergone a yet harder fate, from some disadvantageous circumstances in the temperature of their climate. For since its first introduction, in 1741, it has never entirely left them, but maintained its ground, though with various degrees of violence, at different times, and at present it makes great ravage in the parts of those countries where cattle most abound.

These later invasions of several parts of Europe by the murrain, have furnished the opportunity of making the following general observations on its effects and consequences.

It is to be remarked that as the infection of this disease prevails only at particular times anywhere, and acts with greater violence at some times and in some places than others, according to the preceding view of its migration, so it affects only part of the cattle anywhere, and those with various degrees of malignancy. This leads us to explore in what this difference of the cattle's being susceptible of the infection, or exempt from its effects, when exposed to it, may lie. On examination of this matter it will appear that where the infection does not before subsist, it never comes but after some general cause has weakened the habit of the beasts in general, such as very severe cold, long continued want of a sufficient quantity of wholesome food, repeated alternations of heat and cold in the weather, moist air, replete with putrid vapours, a long continuance of easterly winds, or, what is more frequent, a combination of two or more of these causes together. Thus we find this contagion invading every part of Europe after the year 1711, when the season had been so inclement the year before as to destroy a great portion of the sheep in England; and again in 1741, as mentioned above, after a very intense frost, which lasted from December to April, and by the rigour of cold and scarcity of fodder, had reduced the cattle in general to a debilitated state, which was still aggravated by the almost constant easterly winds that blew the summer and autumn following. After the abatement of it, in more clement seasons, which followed that period, we find the disease resuming its force again in various places, since that time, by similar accidents. We see, also, that from the same principles, it has long maintained its ground in countries where moist air and vapour of stagnated water disposes to agues and other diseases that come from the laxity of the fibres, which disposition is equally produced by these causes, in the brute and human species. While, on the other hand, it has been extinguished in places where a drier and purer air gives robustness and vigour of constitution to the animals, it had been observed, also, that the infection, when it has abated during the summer or winter, has generally resumed fresh vigour in the spring and autumn, when the alternations of heat and cold have disordered and weakened the beasts.

The same principle, with respect to the cause of the prevalence of the contagion, holds good, as to the particular beasts which are seized with the disease, or escape the contagion when exposed to it. For we see, in all cases, it is the weaker which are attacked by it, and the stronger which remain free from it. It is ascertained, by a very sufficient basis of remark on facts, that the beasts of a black, dark, or red colour, either wholly or in mixture, are less subject to the infection than those which are white, or of a light mixture of colours; and the concurrent observation of all times has established the belief that this difference of colour is an indication of the greater or less degree of natural strength of the beasts, as well in neat cattle as horses. It is equally certain that bulls are less subject to the infection of this disease than oxen, oxen than cows, cows not pregnant than those which are; and, among all these, such beasts as appear naturally of a feebler make, or are debilitated by any accidental suffering.

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either in detached essays, or pieces inserted in journals and periodical works. The chief of these are Lancisi, Ramazini, Perrault, Pujerus, Blasius, Bates, Blondel, Goeliche, Ranold, Brucknerus, Engelman, Noseman, Tak, Kroot, Manchart, Brocklesby, Mortimer, Buffon, Grashuys, Marquis de Courtivron, Swenke, Layard, Camper, and Monchy.

It is manifest, too, from an equal ground of observation, that the same difference in strength and weakness which renders the cattle more or less susceptible of the infection, makes them more or less liable to the violence of the effects of it. Those which are weaker from any of the above causes have more aggravated symptoms, and more frequently die of the disease in proportion to the degree of such causes.

It results, therefore, from these circumstances, that though infection conveyed from some beasts diseased with it is the efficient cause of the murrain in cattle, yet there is a predisponent cause, or particular state of the subject, absolutely necessary to its acting or taking effect; and this predisponent cause is the condition of the beast with respect to weakness of habit or relaxation. It appears also that this weak state of the beast may arise from general causes, either of an epidemic nature, affecting whole regions, such as inclemency of season, or scarcity of wholesome food; of an endemic nature, affecting only particular places or countries, such as dampness of the air, or abundance of putrid vapours; and it may be produced also from some particular cause regarding the individual only, such as original weakness of constitution, pregnancy, or debility occasioned by some accidental suffering.

The susceptibility to the infection, and the predisposition to be more violently affected by it, in consequence of the weakness of the habit, are neither peculiar to cattle nor to this disease. It is evident, from what offers, in a very extensive field of observation, that both mankind and brutes are liable to the attacks of most contagious disorders in proportion to their defect of strength. Even were it not so well verified by notorious facts, a theoretic proof might be drawn from incontestible principles of physiology, and from the constant effects of medicine administered in such cases. But this is too wide a range of subjects to be entered on here, and would, besides, require a previous acquaintance with medicinal science in order to its being understood. That beasts are liable to take the infection of the murrain, and suffer more from it, in proportion to their weakness, is sufficiently obvious from just remarks on the subject itself; and it is very necessary to be understood and taken into consideration in all practical disquisitions on that disease, because it constitutes a principle which admits two very useful applications. It not only affords the means of prognosticating, when great numbers or single particulars, will be seized with the disease, if exposed to the contagion, and, consequently, supplies the proper notice and warning for the use of preventive methods, but it furnishes, likewise, the true indication of cure, and points out what the regimen should be that will counteract the disease.

The manner in which the contagion may be conveyed is likewise a matter of great moment in the consideration of the murrain with a view to the preventing its injurious effects.

The observations already made on facts have not set everything relating to it in a clear and decisive light. There are some opinions respecting it, in which all agree, because they are supported by evident instances; but there are others which, though they have the sanction of common assent, may yet be disputed on very just grounds. It is unquestionably certain, that the murrain is communicated by transmission of some contagious matter from beasts which have that disease to those which are sound; but that this is done by all the means of communication generally supposed is not at present so manifest a matter.

The effect of inoculation in the murrain, as well as a great number of other palpable facts, render it plain that the contagious matter may be carried by other bodies, which receive it from the diseased beast, and convey it, by actual contact, to the sound. This may be performed by any substance to which the infecting particles can adhere, but is most likely to happen, through accident, by the mediation of any body that is of a hairy, woolly, or pilous texture,[*] because the matter is much less liable to be rubbed or cleansed off from such bodies, than from those which are denser and have an entire and smooth surface.

But there is another mode of conveyance of the infection, which, though it must be allowed to subsist with regard to some contagious disorders, admits of a doubt with respect to the murrain, that is, the communication of the contagion by the air. It is in general taken for granted that the air is the chief vehicle of the contagion of this disease, and several means of prevention of its action have been instituted on that principle. But there is no clear fact which in the least proves this notion, and the universal failure of the preventive means founded on it, furnishes arguments aguinst it, as far as anything at all can be thence inferred. On the other hand, a great number of circumstances seem to evince that the cattle are never infected, but by an actual conveyance of the contagious matter, by means of contact of a sound beast with one that is diseased, or with some other body, which receives first the virulent matter from such beast. There are many instances where good fences, and other effectual means of exclusion of whatever could bring the infecting matter, have prevented the cattle in particular places from suffering by the contagion, though surrounded on every side by numbers of beasts seized with the disease. In some of these places the cattle have escaped to the last. In others, after a time they have taken the infection in consequence of known accidents, which occasioned the introduction of the contagion, from the actual conveyance of it by somewhat that had received the virulent matter from a diseased beast. Where the neighbouring infected cattle were, in these instances, all on one side the place in which those that escaped were confined, this exemption of them might be reasonably imputed, as it has been, to the wind blowing the contrary way, and carrying off the contagious effluvia that might have otherwise reached them. But this solution of the difficulty cannot hold good, when, as has been frequently the case, the free place where the cattle escaped was surrounded by infected beasts on every side. The determination of this point is not merely a speculative object, for it settles the proper nature and limitations of the means to be used for the prevention of the communication of the infection, and rightly confines them to such as regard the hindering the contact of diseased beasts with the sound, or the exclusion of bodies which may convey the virulent matter from the one to the other.[†]

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[*] It has, however, been strangely made a matter of doubt by some eminent professors in the United Provinces, whether the skin itself of a dead infected beast would impart the contagion, and they have even asserted the negative, in consequence of the result of certain experiments made for the determination of this point. But some fallacious circumstance attended those experiments, as appears even on the face of the relation. It would, indeed, require very strong proofs to gain assent to such an opinion, than which a stranger paradox can scarcely be advanced. It is evident the infection is conveyed by other substances; and nothing can be more suited to collect and retain the matter of it than a hairy skin. The matter must, undoubtedly, abound in the skin of the beast which generates it, whether it be evacuated by the perspiration, saliva, or any other excretion. Indeed, whatever other bodies convey it must in general receive it from the skin, which, if it can impart the same to them while the animal is living, must, in common with other bodies, retain it a certain time after the beast is dead.

[†] The opinion that the infection of the murrain is conveyed by the air, has been adopted by the writers on this subject, successively, in all the different periods since this disease was first known, without any examination of the fact on just ground of proof. It seems to have been received on the authority of Hippocrates, who said all diseases were communicated by the air. But this is a bad foundation for such a notion. For his meaning in this general assertion appears plainly, by other passages, not to be that all diseases are communicated by contagion transmitted by the air, but that the air has always some share in the original production, or in the reception of

From the facts which have appeared respecting the disease, there is season to infer that the contagious matter retains its infecting power a considerable time. The contagion is believed in several instances, from very strong circumstances, to have been conveyed to remote places in bodies transported by sea, as the known intercourse with the countries whence it was presumed to be brought palpably suggested that manner of its introduction, which could not be otherwise accounted for. Some of the later experiments with regard to the inoculating cattle with the disease show this fact with greater certainty of proof. The precise limitation of period in which the infecting matter will keep its power is not, however, well ascertained by any observations or trials; but there is room to conclude that, under some circumstances, it will act at a considerable distance of time from its being generated. We see the variolous matter will communicate the small-pox after many months; and there is no foundation for any doubt of the analogy betwixt the contagion of that and of the murrain in this particular. But it is a matter of great consequence, and this should be decided by adequate experiments. Because the knowledge of it is of great moment, in judging of the proper means and regulations for preventing the introduction of the contagion into places free from it.

The space of time, likewise, betwixt the beasts receiving the infection and the perceptible effects of it, is not yet precisely settled by accurate observations. But there are well-known facts that give us a considerable degree of information with regard to it. In general, appearances will be found in three or four days; in some few instances they may not come on till six or seven. We may state the latter time as the utmost period, unless when the beasts are very slightly affected with the disease, and then, where the symptoms may not be discernible till it be in its most powerful state, ten days may be allowed. If a beast, therefore, suspected to have received the infection, do not show any signs of it in six or seven days, there will be very little danger of its being seized; and if none appear in ten, it may be taken for granted that there is no infection in the case.

The time for detaining cattle in any place to which they have been removed, after having been exposed to a risk of the infection, in order to prevent their spreading the disease to other parts, may be therefore limited to a fortnight. Since there is not the least hazard after such time of their being seized with the disease, in consequence of their having been exposed to the contagion so long before.

These are the general facts and observations respecting the murrain which have hitherto presented themselves. It is proper to subjoin that, as before intimated, this disease has various appearances, symptoms, and degrees of mortality, at different times, and in different places; as the epidemical effects of the seasons, or endemical circumstances of particular countries, have interfered with the natural process of the disease. In the United Provinces a profuse diarrhæa, or looseness, is a very common symptom, and generally carries off the beasts by exhausting their strength; but, where they do not recover, it seems to be the critical evacuation by which the virus of the disease is discharged. Eruptions more rarely attend the murrain in that country, though they are not always wanting. On the contrary, in Great Britain the looseness seldomer happens, and is mostly a mortal symptom, though, in some few cases, a salutary one. Eruptions occur much more frequently, and are generally the critical deposit of the virus when the beasts recover. In Denmark the disease, when it made its furious attack in 1759, was far more violent and mortal than it was ever know in England or Holland, or than it had been when it infested the same places before. The fatal crisis was then very rapid, the beasts dying in two or three days, and some sooner, after they first appeared to be affected. At some periods, remarkable blisters on the tongue are related to have been an early and general symptom of this disease;* they are not near so frequent now, and only found at or towards the end of the disease. Like variations are, as above intimated, seen in other malignant contagious diseases; and render an accurate observation of the symptoms, when they break out fresh at a distance of time, necessary to the forming a just description of them, in order to the distinguishing them with certainty from others which are similar.

(*To be continued.*)

IMPROVEMENTS IN RAILWAY CARRIAGES.

Mr. Rock Chidley has recently brought out an invention for improvements in railway carriages, which consists mainly of affording easy means of communication through the whole of the carriages of a train, and an economical mode of warming and ventilating them. For the first object the inventor proposes an opening at the end of each carriage, the connection being made by means of a covered or hooded platform, constructed so as to expand if required from a space of a few inches to one of several feet. The object is to give the guard of the train an easy means of communicating with any of the passengers. Below the flooring (which is perforated) of each carriage a serpentine pipe is placed, and the pipes below adjoining carriages being connected they can be supplied with steam from the engine for the purpose of warming. Simple provisions for a safety valve and self-acting taps for the discharge of the condensed water have been made. The degree of heat is regulated by means of a perforated slide worked by a simple contrivance inside the carriage. Ventilation is accelerated by admitting the air through the perforated flooring required for the warming, and by an air passage between the top of the compartments and the roof of the carriage, on which latter are set ventilators, having a cowl above to turn with the wind. Another way is by means of self-acting valves. The inventor considers either plan sufficient to secure the carrying off of vitiated air and at the same time preventing down draught. A new arrangement of doorway intended to render ingress and egress of passengers safer than at present is a part of the invention.

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them by particular subjects. And even this doctrine is not to be maintained on any demonstrative principles. For we are certain that there are contagions of which the infection is not conveyed by the air, as the venereal disease, elephantiasis, yaws, and itch, and we know so little of the origin of them, that we can by no means presume to say the air had any part in their first production. In the elephantiasis, and in most other contagious diseases, it does, indeed, appear, that the air, epidemically or endemically, may act as a predisponent cause to the contagion's being received; but there is a great defect of evidence of its being actually a vehicle of the contagion with relation to most such diseases. Because it is very difficult to prove, in any particular instance, the infection may not have been communicated, by means of some other body, from the diseased to the sound subject. It must, nevertheless, be allowed that some contagious diseases are transmitted by the air; but, on nice examination of facts, we shall have reason to conclude them much fewer than are generally allowed; and that, perhaps, we have no competent proofs of any case where the open air has been the vehicle, though there are many clear cases where air, long confined in close places, or depraved by the respiration of too great a number in the same room, has conveyed the infection of such diseases.

*** There is, as was above observed, another contagious disease of the cattle, of which blisters on the tongue seem, from the accounts of it, to be a constant, principal, and characteristic symptom; and proper care, therefore, should be taken to avoid confounding this disease with the murrain, either in reading or practice. It appears to have been curable, in most subjects, solely by opening the blisters; and is, therefore evidently of a much less malignant nature than the murrain; in which, as is well known, from many trials, that operation would be of very little avail. This circumstance alone would give a sufficient criterion for distinguishing the one from the other.**

RETURNS OF LIVE STOCK IN GREAT BRITAIN.

The following correspondence and schedule explain the steps taken by Government to procure the required returns:—

Office of Committee of Privy Council for Trade,
Whitehall, 6th December, 1865.

Sir,—I am directed by the Lords of the Committee of Privy Council for Trade to request that you will move Secretary Sir George Grey to cause the County Magistrates in England and Wales (and the corresponding authorities in Scotland) to be informed of the steps about to be taken by the Board of Trade, for the purpose of ascertaining the number of Live Stock existing in Great Britain.

My Lords rely much upon the good offices of the County Magistrates, whose assistance will be most valuable in advising their own tenantry and the neighbouring farmers to give prompt and careful attention to the schedule to be transmitted to them by post, for a return of the number of Live Stock upon land in their occupation.

The published correspondence upon this subject between the Cattle Plague Commission and the Board of Trade will explain the object of the inquiry, and my Lords entertain the hope that the required information will be successfully obtained by voluntary returns from the farmers and occupiers of land. But it is very desirable that no means should be neglected of guarding against the refusal of information in consequence of misapprehension on the part of the farmers as to the intentions of the Government in making the present inquiry.

The collection of returns from so large a class of persons as the occupiers of land in Great Britain can only be undertaken by the Government; and it is of course desirable, on the ground of public economy, that officers already employed in the public service should, if practicable, be made available for collecting the statistics of Live Stock.

In order, therefore, to avoid creating a new and costly machinery, the distribution and collection of the schedules will be intrusted to the department of the Inland Revenue, acting on behalf of the Board of Trade.

The schedules will bear the post-office stamp for transmission to and return by each occupier of not less than five acres of land.

There will, therefore, be no occasion to trouble the occupiers by a personal application for the return, if they will only be good enough to fill up the schedule and return it by post, according to the address printed upon it.

As the value of the information will depend upon the completeness of the returns, it will be necessary to make a further written or personal application to occupiers who neglect to fill up and return the schedule.

It is to be hoped that this trouble to the occupiers and the officers employed will seldom be necessary, as it will occasion delay in the publication of the results of the inquiry; and an early knowledge of the supply of stock in the country is manifestly most desirable.

Every endeavour will be made to obtain the returns with the least possible trouble and inconvenience to the occupiers of land, and it is the earnest hope of my lords that English agriculturists will show themselves as ready to afford information of such special and national interest as the agriculturists in Scotland, Ireland, and foreign countries.

Copies of the correspondence between the Cattle Plague Commission and the Board of Trade, and of the form of schedule to be transmitted to the Board of Trade are enclosed, which my lords suggest should be transmitted with the letters from the Secretary of State.

I have the honour to be, Sir,
Your obedient Servant,
J. Emerson Tennent.

The Under Secretary of State, Home Office.

Correspondence Referred to Above.

Cattle Plague Commission, House of Commons
(Principal Floor, Room 10), Westminster, S.W.,
24th October, 1865.

Sir,—I am desired by Her Majesty's Commissioners for inquiring into the origin, nature, and treatment of the cattle plague, to represent to you, as president of the Board of Trade, the importance of obtaining correct information respecting the number of horned cattle and sheep existing in the country.

Such returns, if they were in existence, would be valuable on the present occasion.

I may mention that the government of the Netherlands, which is in possession of returns of this kind, is thereby enabled to publish weekly an exact statement not only of the positive but of the proportionate loss in every commune which has been attacked by the disease. Such a statement could not be published here. This, however, is by no means the only way in which such information would be useful.

I have the honour to be, &c.,
(Signed) Mountague Bernard.

The Right Honourable T. Milner Gibson, M.P., &c.,
Board of Trade.

Office of Committee of Privy Council for Trade,
Whitehall, 3rd November, 1865.

Sir,—I am directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 24th ultimo, addressed to the President of the Board of Trade by desire of Her Majesty's Commissioners for inquiring into the origin, nature, and treatment of the Cattle Plague, to represent the importance of obtaining correct information respecting the number of horned cattle and sheep existing in the country.

The representation of the Commissioners has received the prompt and anxious consideration of My Lords, and they entirely concur with Her Majesty's Commissioners as to the importance of ascertaining the stock of cattle existing in this country.

If such information were obtained it could not fail to be of great utility and interest, at the present time, to the agriculturists as well as to the public at large.

It appears that this country is almost exceptional in not possessing returns of the number of its cattle. Unfortunately it is for the chief division of the United Kingdom, England and Wales, that there is an entire absence of information, upon which reliance can be placed, as to the stock of cattle. Returns of the live stock in Ireland are annually obtained; and the number in Scotland was ascertained in the years 1855-6-7. The farmers in Ireland and Scotland have readily furnished this information by voluntary returns, and it is only in a similar way that the same particulars could at present be collected for England and Wales.

The Lords of the Committee of Privy Council for Trade are most desirous to promote the inquiry proposed by Her Majesty's Commissioners, and will take immediate steps to invite the co-operation of English agriculturists in a work of such manifest interest and importance.

I am, therefore, to request you will inform Her Majesty's Commissioners that orders will forthwith be given for the preparation and distribution of schedules for ascertaining the number of each kind of live stock in Great Britain. The inquiry will be extended to Scotland, in order to obtain the information for the three divisions of the United Kingdom at one time.

The number of live stock belonging to individual persons will not be divulged.

Aggregate returns of stock will be prepared for specified districts, and such results only will be printed and published by the Board of Trade.

I am, &c.,
(Signed) J. Emerson Tennent.

Mountague Bernard, Esq., &c.

Board of Trade.—Schedule for Return oe Live Stock.

It is particularly requested that this schedule may be filled up on the day of 1866, and transmitted, immediately, by post, to the collecting officer (name and address given). The returns of individual occupiers will not be published.

Number of Live Stock upon Land in the occupation of the undersigned, on the day of , 1866.

If separate farms in two or more parishes be occupied, separate returns of stock are to be made for each.

Parish of——— County of———

1. Stock taken in to graze is to be returned as belonging to the occupier of the land upon which the stock is grazing.

2. Stock driven to fairs, markets, or elsewhere for sale, upon the day of , should be included in this return by owners of such stock.

	Number of Cattle (Not including Horses).			Number of sheep.		
		Other Cattle.				
	Milk Cows.	Two years of age, and above.	Under two years of age.	One year old and above.	Under one year old.	Number of Pigs.
Please insert on this line, *in Figures*, the particulars required.	....	....	....	....	....	....

Signed Occupier.

The Cattle Plague Commissioners have reported that it is highly desirable to obtain returns of the number of cattle and sheep within the area of every parish in Great Britain.

GARDENING IN PARIS.

There are few things in Paris which strike the visitor more than the luxuriant exhibition of flowers which meets the eye in all quarters. In the gardens of the Tuileries, the Louvre, and the Luxembourg, in the ornamental beds and around the fountains in the Champs Elysées, in the Bois de Boulogne, at one extremity of the city, and in the Bois de Vincennes at the other, in the beautiful little Parc Monceaux, in another pretty pleasure ground, less known to strangers, in the Batignolles, in the garden formed around the fine old gothic Tower of Saint Jacques, near the Hotel de Ville, and in a dozen other squares and ornamental corners of the city, every scrap of available space is filled during the greater portion of the year with a profusion of ornamental trees and shrubs and thousands of flowers, indigenous and exotic. Nor is it in the streets and gardens alone that this floral abundance is to be seen; whenever a ball or other entertainment is given, at the Hotel de Ville or elsewhere, under the municipal authorities, the halls, staircases, and *salons*, are decorated with brilliant flowers of almost every description. It may easily be guessed that all this decoration is the result of an extensive and careful organisation, and that the gardener of Paris has no sinecure. The establishment, or rather establishments, in which these shrubs and flowers are reared for the city of Paris—the supply of the palaces and other places belonging to the State is derived from other sources—are in fact not only extensive, but perhaps unique of their kind and admirably organised.

M. Barrilet Deschamps, who fills the post of gardener-in-chief to the Ville de Paris, has his head-quarters at Passy, just without the limits of the Bois de Boulogne, and adjoining the property known as La Muette, once a royal hunting-box and summer-house, and now the residence of Madame Erard, widow and mother of the famous pianoforte manufacturers of that name. This establishment includes a considerable space of garden ground, in which are reared half-hardy shrubs and flowers, and upwards of twenty glass houses, some of them of great size, for the rearing of exotics and for their preservation during the cold months of the year. The striking-house is a model of excellent arrangement, the heat of the various parts being carefully graduated to meet all circumstances, and every inch of space being economised with the greatest care. The cuttings and young plants are placed under several different kinds of glass, according to their size and form; the former are placed in thumb pots, embedded in tan, and are covered with large circular glasses; tall bell-glasses, or shades, are used for certain plants, while larger ones are placed under quadrangular glass cases of various dimensions, with sloping tops, hinged at the upper portion of the zinc frame. Several modes of heating are employed and careful experiments made as to the results, and amongst other systems now under trial is one of heating by means of gas in the open air, the pipes passing under ground, and the plants being merely protected by an awning, so as to give them the double advantage of warm soil and fresh air. Of the conservatories, two of the largest are those which contain the collections of *Camelia japonica*, some of which are planted in the ground, and from which the flowers are cut for decorative purposes, while others are in pots and boxes and are transported wherever they may be wanted. A large portion of this collection is historical, having been originally in the gardens of Malmaison, the residence of the Empress Josephine.

There are nearly a hundred persons employed in this establishment; besides the director, M. Barillet Deschamps, there are, a chief gardener, an inspector, whose duty is to watch over the parks, squares, and other places which are supplied with flowers, and to see that they are all kept in proper condition; fourteen gardeners, each having the management of a section of the establishment; from twelve to twenty sub-gardeners, forty-four pupils, and eighteen boys. The number of parks, gardens, squares, and public places to be supplied with shrubs and flowers, as far as possible all the year round, is said to amount to more than seventy, and towards this work the municipal garden contributes annually two millions and a-half of plants. Its cultivation is confined to new plants, half hardy and exotic; there are, under the same direction, another garden at Vincennes for hardy plants, and two nursery grounds in the Bois de Boulogne for shrubs and trees.

A few weeks since when the writer visited the establishment at La Muette, nearly the whole of the conservatories were empty, the two millions and a-half of flowering plants were on duty all over Paris; during the last fortnight the weather has changed the order of things, the more tender children have already gone home to their winter quarters in the nursery, their somewhat more hardy brethren are following fast, and in another week or two all who are unable to face the wet and cold of the winter months will be housed, and scarcely a square foot of space in the whole range of glass houses will be unoccupied. Every year naturally increases the demand for space, and every season the establishment becomes more extensive and more interesting.

The gardening in the Bois, public pleasure grounds and plantations, is also under the charge of M. Barillet-Deschamps, and there are about five hundred gardeners and labourers employed in these various places. The flowers and shrubs are conveyed to and from La Muette by means of large, shallow spring vans, which belong to the establishment, but the horses, not being required all the year round, are hired.

Another feature of the Paris garden deserves notice; no plants are sold, and scarcely a leaf, certainly not a cutting, can be taken out of the establishment; the regulations are most strict in this respect, but a system of exchange is established which is very beneficial to the gardeners of Paris and other places, as well as to the municipal establishment. A catalogue of the plants in cultivation is published annually, with prices attached, and exchanges are made with those who possess any new species or varieties of plants, or any, in short, that the director may require; the packages are charged according to a printed tariff, and the cost of transport is paid by those who make the exchanges.

Amongst the plants to which the gardener of the city of Paris has paid special attention are the large-leaved plants of Algeria, the Philippine Islands, and other warm regions, some of which are of gigantic growth, and specimens of which are to be seen at every season in all the gardens of the city. The Banana has been extensively cultivated, and there were, not long since, many fine specimens growing in the open air; one especially in the Parc Monceaux at least twelve feet in height, and bearing an immense bunch of fruit, which may be developed in the warm atmosphere of its winter quarters at La Muette; the leaves of this plant are at least six feet long, exclusive of the foot stalk; this is the finest specimen that has yet been sent out of the nursery; it is of the variety known as the Banana of Paradise. The bamboo, and the castor oil plant, have been introduced with great success in all the gardens. Several varieties of palms also are to be seen growing in the open air during the summer months. The Hibiscus is another tribe with which M. Barillet-Deschamps has been very successful; of these the *Rosa sinensis* is the most remarkable, it grows to the height of several feet, from five to eight or ten, and bears a profusion of magnificent red blossoms, almost as brilliant as those of the cactus, though not of the same hue; to give an idea of the rates at which exchanges are made, it may be mentioned that small plants of this shrub are marked in the catalogue at one franc each, plants thirty inches high at five francs. and those of five feet in height at ten francs: the *Hibiscus giganteus* and *Speciosus roseus* are also fine shrubs, bearing, the former, yellow and brown, and the latter bright rose-coloured blossoms. Of the special collections, the following are the most important:—That of the *Araliaceæ*, of which the garden possesses forty species; of these the *Aralia papyrifera* is most remarkable, its leaves attaining a diameter of fifteen to eighteen inches. The *Aroidæ*, consisting of more than fifty species, including *Alocasia cuprea*, and *metallica*, with their metallic copper-coloured leaves; *Colocasia*, *Philodendron* and *Xanthosoma*, each in numerous varieties. The collection of Ficus includes nearly all the kinds known, and more than fifty species are offered for exchange. Bigonias have been propagated to a great extent, amongst others *Miniata fuschioides*, with its small leaves and beautiful coral bells, which flourishes luxuriantly in the open air in Paris; *Begonia boliviana*, with leaves more than two feet in diameter; *Begonia prestoniensus*, with its flowers of cinnabar red; *Begonia tomentosa*, with blood-red leaves, and many other beautiful and curious species. *Canna*, first planted out in the open air in Paris, in 1855, are to be seen in the public gardens every summer in great variety. The collection of *Dracæna* includes thirty or forty species. A large number of ornamental graminiferous plants for the decoration of lawns, amonst which are the *Andropogon formosum* and other varieties; *Arundo mauritanica; Bambusa*, some of which attain the height of twelve and even more feet in the open air; *Cinna arundinacea; Eryanthus ravennæ*, from the shores of the Mediterranean; Saccharum and others. The semi-acclimitisation of the *Musa rosacea, discolor, sapida, sinensis, vittata*, has been very successful, and many other species are raised in the gardens. The collection of *Solanum* is said to be the most complete that has ever been seen on the continent; seventy or eighty varieties are largely cultivated, and many more are now being brought forward; the greater portion of this class of plants has succeeded well in the open air of Paris; amongst these may be named the varieties, *Amazonicum, atrosangineum, auriculatum, betaceum*, which attains the height of ten feet; *bonariense, calycarpum, crinitum*, with superb foliage; *discolor*, with spotted stalks; violet leaves and rose-coloured flowers; *Eneodontum*, with great spiny stems; *Pastigiatum giganteum*, with masses of purple flowers; *glutinosum, Japonicum, laciniatum*, and *marginatum*, the finest of all the kinds introduced into cultivation in Paris, with large silvery leaves and splendid white flowers, with a small purple star in the centre. No class of plants, however, has received more attention than the Pelargoniums, of which nine hundred varieties are cultivated in the garden, and which flourish in the parks and squares in great beauty and profusion. Amongst other novelties lately introduced is a species of Amaryllis, with blue flowers, presented to the garden by an amateur.

The transplantation of large trees has been carried on with great success in Paris during the last ten years; long boulevards and whole plantations have been planted with trees of all sizes, removed from the woods belonging to the state, and generally with great success. A tree thus transplanted to the Park Monceaux has attracted considerable attention; it is a fine *Araucaria imbricata*, raised from seed in the Jardin des Plantes twenty-seven years since, and taken to Vannes, where it flourished till 1863, when it was brought back to Paris. This tree is twenty feet high; its roots, which are spongy and very delicate, measure more than ten feet in length, and it had to be carried nearly three hundred miles, a difficult operation successfully performed. Another remarkable case, mentioned in the *Journal of the Imperial Society of Horticulture*, is that of a chesnut tree, more than sixty feet high, and of which the root, with its surrounding mould, measured forty metres cube. This large tree was also moved with complete success. The method adopted is that invented, or made use of, by the late Sir Joseph Paxton; after the roots have been dug round, and the tree isolated, a strong waggon, or rather frame upon wheels, and open behind, is backed so as to enclose the tree, which is then raised by chains and windlasses attached to the waggon, and afterwards conveyed in an erect position.

PARIS EXHIBITION OF APPLIED ART.

This exhibition has recently closed, and has proved the greatest success of the kind that has yet been achieved in France. According to the official account, 215,000 persons visited the exhibition, not including nearly a thousand artists, journalists, and their friends. The receipts amounted to a sum equal to £5,622, and the expenses to £1,422 less, leaving the last named sum to be applied, according to the rules of the society, to the purposes of its museum and library.

The prizes awarded for industrial designs were seven in number, one of one hundred francs, one of two hundred, and five of five hundred francs each; and for industrial products, six prizes of honour in gold, and forty of the first and sixty-three of the second-class in the form of large bronze medallions, bearing the head of Apollo surrounded by rays, and beneath a group of emblems of art and industry. This medallion is the work of a sculptor named Liénard, whose design was chosen from amongst a large number in competition. The heads under which the exhibition, and consequently the prizes, were classed were as follow:—Art, as applied to house decoration—to stuffs for furniture and articles of dress—to furniture—to the common metals, the precious metals, and other costly materials—to glass and porcelain—to education and general extension—and to miscellaneous matters.

At the distribution of the prizes, addresses were delivered by the president of the *Union Centrale des Beaux Arts* and several other gentlemen, the chief interest attaching to the explanations relating to the proposed College of Industrial Art, of which an account has already been given in the *Journal*. M. Duruy, the Minister of Public Instruction, was present, and addressed the assembly, and M. Guichard, the president, took the opportunity of publicly giving to that gentleman the honour of the conception of this grand idea, and in so doing related the following interesting circumstances:—"It is just a year ago, almost to the day, that the Minister visited the Museum of the *Union Centrale*......He immediately saw, with the rapid perception of a mind constantly intent on every kind of study and all forms of progress, the whole scope of our intentions, comprehended and approved our modes of action, and encouraged us to proceed in what he believed to be a very promising scheme. Presently, placing his hand on a portrait of Saint Peter, a *chef-d'œuvre* of embroidery, the work of I know not what artist of the sixteenth century......the Minister told us that he had worked with the view of obtaining admission as an *ouvrier* at the Gobelins, and added, with a smile, that he might therefore take upon himself to say something about art and its application to industry, and, after some remarks on the want of general knowledge amongst modern as compared to ancient artists and art-workmen, dwelt on the necessity for developing, enriching, and illuminating the thoughts, the intellect, and the soul of the artist at the same time that his hand is being educated, for it was only by this double education that great masters and glorious schools of art were founded. It was after this visit that the minister proposed to the Council of the *Union Centrale* the idea of a college of applied art which he had cherished for a long time in his mind. The Council took three months to consider the question, and at the end of that time came to the determination of using all its means and energy for the establishment of such an institution." M. Guichard then explained, to quote his own words, that no professional study would take place in the college in question, and, in pursuance and explanation, he quoted the following passage from a recent work by the minister, M. Duruy:—"In our time a deplorable system of education tends to divide the man instead of completing him, and to develop one of his faculties instead of establishing an equilibrium amongst them all; that is what is called professional education, the education of specialities. This education, more industrial than human, will finish by materializing humanity; it forms admirable instruments and deforms the man. If this almost brutalizing education, founded solely on the materialist principle of the division of labour, is not reformed, special men will become more common, and truly great men more rare than ever." The college education would therefore have for its aim, said M. Guichard, the opening to its pupils of all the sources of the true, the good, and the beautiful, not only on their plastic, but in their immaterial manifestations.

It may be added here that the *Union Centrale* has completed the purchase of the land for the erection of the college in question, which consists of a site measuring 12,000 square mètres, and situated in the Faubourg Saint Antoine, not far from the spot where the old Barrière du Trône, better known as that of Vincennes, stood previous to the recent extension of the limits of the city.

Fine Arts.

Art-Budget in France.—The Minister of Finance includes in his estimates for the year 1867 the sum of 7,951,000 francs, or nearly £320,000, for decorative works connected with the Palace of the Tuileries and the new Opera-house.

Pictures by Living French Artists.—The late Duc de Morny, it is well-known, possessed an excellent gallery of works of art, for the reception of which he constructed a gallery in his official residence annexed to the Legislative Palace; the Comte de Walewski, who succeeds to the presidency of the Corps Legislatif, has proposed to the Government that a portion of the works of living artists which are the property of the State shall be placed in this gallery. It is said that the count's proposition has been agreed to, and, if so, Paris will have the commencement of another exhibition, and the Palace of the Deputies, as well as that of the Senate at the Luxembourg, will have its gallery. The residence of the President on the Quay, opposite to the Tuileries, would be a most convenient spot for a public gallery.

Manufactures.

Exceedingly Hard Iron.—The *Mechanics' Magazine* says:—Some years ago M. Gaudin found that by heating iron, tolerably free from carbon, with a small quantity of boron, to a very high temperature, he obtained a product which could not be forged, but which possessed extraordinary hardness. He has now found that an equally hard metal may be obtained by adding to ordinary cast iron, in fusion, phosphate of iron and peroxide of manganese—he does not mention in what proportions. The product cannot be forged, but it casts easily, and is therefore readily applicable to the construction of such machines, or parts of machines, as require in their material extreme hardness rather than tenacity. The metal so produced, is moreover singularly sonorous, and M. Gaudin accordingly proposes it as a material for bells. He finds that a still harder metal is producible by the addition of tungsten—again he omits to say in what amount—to ordinary cast iron. He states that this tungsten iron surpasses everything previously known as a material for tools for cutting rocks, and that crystals of it will cut glass as readily as the diamond.

New Artificial Marble and Cement.—M. Sainte Claire-Deville has lately made an interesting discovery and a series of experiments, which may lead to important practical results. The investigation originated in an observation of the effect produced by water on a sample of magnesia obtained by the calcination of chloride of magnesium. This anhydrous magnesia, in compact fragments, says M. Deville, was left for several months in a current of water running from a tap in his laboratory at the Ecole Normale, and finally assumed a remarkable consistency, having the density and more than the hardness of marble. When divided into rather thin pieces, it became translucent, like alabaster, and the interior of the mass was crystalline. At the end of six years, during which time it was exposed to the air, no change took place in its condition. When analysed, it was found to contain—Water, 27·7 parts; carbonic acid, 8·3; alumina and iron, 1·3; magnesia, 57·1; and sand, 5·6. M. Deville pulverised some of this substance and mixed it with water, till he produced a semi-plastic mass, and he then left it for several weeks in a tube containing distilled water deprived of gas by boiling, and enclosed in a glass tube hermetically sealed. The magnesia combined slowly with the water, and became as compact and as hard as the first-mentioned specimens. The desiccation caused by exposure to the air caused it to become crystalline and translucent. Some medals were cast with this new substance, treated like plaster, and they assumed under water the appearance of mastic. A mixture of chalk or marble with pulverised magnesia, made into a slightly plastic paste with water, is said to mould well, and to assume extreme solidity under water. M. Deville proposes to apply this substance to busts, and hopes to produce a very valuable kind of artificial marble. But another and far more general and important application of the discovery is that of the making of cement. M. Deville calcined a quantity of dolomite, rich in magnesia, at 300 to 400° centigrade, less than dark red heat, mixed the powder with water, and tried the product as a cement. Experiments have been made with this cement in salt water, and they are reported to have been eminently satisfactory. M. Deville's reputation as a chemist gives great importance to this communication in a theoretical point of view. The only question, therefore, that remains to be solved is the cost of the new artificial marble and cement, as compared with those at present in use.

Commerce.

Beet-root Sugar.—According to official returns, the weight of the green beet-root taken into the manufactories of the Zollverein during the season 1864-5, amounted to 41,641,204 cwt. The numbers of beet sugar manufactories at work throughout the German States during the three seasons 1862-3, 1863-4, 1864-5 respectively, were 247, 253, and 270. The past season, says Herr Licht, in his last circular, has shown itself much more favourable, not only in respect to the amount of beet manufactured, but also with regard to the yield of sugar obtained, than could have been foreseen. According to the latest communications received, the quantity of raw beet-root necessary for the production of one hundred-weight of sugar is not 12·5 cwt., but scarcely 12·2 cwt., and, in consequence, the quantity of raw sugar produced in the season 1864-5, was 170,662 tons, against 151,180 tons and 138,042 tons in the two preceding seasons, 1863-4 and 1862-3 respectively. In France also, according to the latest official returns, there was an increase of 2,896 tons in the sugar production of the past season. The total amount of beet-root sugar produced in Europe during the season 1864-5 has been 482,634 tons, against 385,743 tons in 1863-4, and 452,135 tons in 1862-3 respectively. The beet-root crop of the Zollverein, which is peculiarly difficult to estimate, will show, in the province of Saxony and in the principality of Anhalt, a deficiency of about 10 per cent. as compared with the previous year; which deficiency was more than made up by the extraordinarily rich harvest in Silesia, Hanover, Wurtemberg, and other provinces. For France, the previous estimates of 200,000 tons are now generally raised to 220,000 tons: some have even gone as high as 240,000 tons. The sugar crop of the Zollverein in the season 1864-5 was 170,672 tons, against 151,180 in 1863-4; and 138,042 in 1862-3; in the present season (1865-6) in consequence of the unfavourable weather, the crop is not expected to amount to more than 170,000 tons, although a wider extent of land is now planted with beet, and although the number of factories is greater. In Austria it is assumed that the yield will be from 300,000 to 400,000 centners below that of the previous year. Poland has had a very good beet-harvest, and the yield of sugar is expected to be 2,500 tons more than that of the preceding year. Russia, on the other hand, will produce 10,000 tons less, in consequence of the beet not having come to maturity. The estimate for the beet-root sugar productions of Europe during the season 1865-6 is about 530,000 tons, about 50,000 more than last season, and 150,000 tons and 75,000 tons larger than the produce of seasons 1863-4 and 1862-3 respectively. It must, however, be borne in mind that, in consequence of the abnormal state of the weather during the past year, these estimates, which are formed in advance, will probably undergo considerable modification.

The Duties on Foreign Wines in England.—The *Memorial Diplomatique* says:—"Our Vienna letters inform us that the chief difficulty which had retarded the conclusion of the commercial preliminaries between Austria and England consisted in the hesitation of the St. James's Cabinet to lower its tariff in favour of Austrian wines. Mr. Gladstone, foreseeing that France, in virtue of her treaty with England, would immediately claim for her own wines all the advantages that might be accorded to the Austrian, proposed to place those of the latter country in the second class of the English tariff, which includes potable liquors whose alcoholic strength reaches 25 degrees. On examination, the concession was found to be illusory, inasmuch as Austrian wines, with the exception of some few of Hungarian growth, had an alcoholic force inferior to the above. As, however, the Austrian Government persisted in making the diminution of the wine tariff a *sine qua non* condition of the new commercial arrangements, the English ministers ended by adopting the step of equalising the duty on wines, by fixing it for all countries and qualities, and without any difference on account of alcoholic strength, at one shilling per gallon, whether the wine be imported in casks or in bottles. The English Cabinet having entered into a formal engagement to present a Bill with that object in the next session of Parliament, the preliminaries have been at last definitely signed at Vienna. Thus, owing to the efforts made by Austria, England is at length about to accomplish a customs' reform which was ardently demanded by the French wine-producers, and which consists in assimilating the duty on wine imported in bottles to that levied on the same in casks. This difference of duty was an almost insurmountable obstacle to the propagation and consumption of French wines amongst our neighbours on the other side of the Channel. Henceforward the wine-trade in France will derive from the Anglo-French treaty of commerce all the advantages which the Emperor's Government was justified in expecting."

Indian Tea.—Whilst in China (say Messrs. Travers) the question of our tea supply is always more or less connected with and influenced by political disturbances; in India, so far as tea is concerned, we have nothing to recount but the continued extension of the tea-plant, and the great success uniformly attending its cultivation. This extended cultivation is, of course, greatly stimulated by the prevailing high prices for all kinds of tea, the tendency of which is to encourage production, not in China only, but also in India and Japan. Insignificant as the amount of Indian tea may perhaps appear, as compared with the returns from China, it is certain that this uniformly increasing cultivation must soon make itself felt in our tea markets. As soon as the cultivation of the tea-plant in India is of a sufficiently extensive character to admit of the Indian teas being imported in any considerable quantity, the rivalry between the two kinds—Chinese and Indian—will be commenced on more equal terms; at present the scarcity and the high price of Indian tea preclude its being brought within the reach of consumers in general. As our supplies increase so also does consumption, but not in the same ratio; nor, looking at the probable extension of the tea-plant in China, and its known extension in India, is it likely that these two essential elements of commerce—supply and consumption — will exactly, or even approximately, coincide? So far as consumption is concerned, it seems by no means improbable that an additional field will soon be opened in the French market, by the reduction of their tea duties.

Colonies.

New South Wales Revenue.—The comparative statement of the Consolidated Revenue of this colony and of the special funds paid into the Treasury during the quarters ended 30th September, 1864, and 30th September, 1865, respectively, shows that the total revenue proper for the quarter ended the 30th of September last amounted to £430,843 9s. 8d., against £378,178 12s. 1d. for the corresponding quarter of 1864. The increase on the quarter is therefore £52,664, or a little over 14 per cent. The most important item in this increase, and which now appears for the first time in the revenue returns, is that of Stamps, which has yielded £15,284. The Package duty, which only came into force on the 25th of May last, has brought in £13,415 16s. 6d. Irrespective of that charge, the Customs revenue is greater by about £11,000 than the corresponding quarter of last year, the increase being chiefly made up by the additional 20 per cent. placed on all the duties excepting brandy, gin, tea, and sugar. Increased revenues have also been obtained from land sales and from the balances of conditional purchases. The heads of revenue which show an increase are:—The Customs, £24,394 18s.; duty on refined sugar and molasses, £1,305; gold, £1,845 4s. 3d.; land revenue, £18,483 15s. 2d.; commission on money-orders, £215 4s.; fees of office, £879 4s. 7d.; rents, exclusive of land, £359 2s. 4d.; railway receipts, £1,030 6s.; electric telegraph receipts, £1,243 13s.; pilotage and harbour dues, £214 7s. 3d.; stamps, £15,284 3s. 4d. The heads of revenue which show a decrease are:—Duty on spirits distilled in the colony, £3,430 5s. 2d.; Mint receipts, £574 1s. 11d.; postage, £792 12s. 1d.; licenses, £1,852 13s. 10d.; fines and forfeitures, £180 6s. 11d.; miscellaneous receipts, £5,821 9s. 2d. In the Customs revenue there is an increase on all the articles excepting coffee and chicory and wine. The decrease on the latter, however, is only £81 8s. 9d. Under the head of Land Revenue, there is an increase of £19,674 8s. 8d. on land sales, and a sum of £11,364 8s. 3d., as the balances of conditional purchasers, with a sum of £3,424 as the interest on those balances. The rent and assessment on pastoral runs has, however, fallen off to the amount of £15,246 7s. 1d. During the first nine months of the present year the total revenue proper has amounted to £1,136,442, against £1,005,994. The increase in favour of the present year is therefore £130,448, or nearly 12 per cent.

Publications Issued.

Elements of Physics; or, Natural Philosophy written for General Use in Non-Technical Language. By Neil Arnott, M.D., F.R.S. (*Longmans.*)—Part II. is now issued, completing the work. Part I. was issued some time since, and a notice of it appeared in the *Journal* of April 15th, 1864. The present is the 6th edition, and the only one which has ever been completed. It has much additional matter on subjects previously treated, and also contains chapters, now for the first time published, on electricity and astronomy, with an outline of popular mathematics.

Notes.

The Architectural Press and Captain Fowke.—A correspondent writes:—One or two persons having raised doubts as to the confirmation by the press of the judges' award to Captain Fowke's plans for the Natural History Collection, the following extracts are made from the only newspapers which are known to have criticised the plans in detail. The award was made by Mr. Tite, M.P., Mr. Fergusson, Mr. Pennethorne, architects; Mr. D. Roberts, R.A., an architectural painter; and Lord Elcho; and no voice was raised in Parliament impugning their decision. The *Telegraph* said, "If the judgment arrived at unanimously we believe by such an art-conclave as this be at all questioned, it must be questioned on its own merits, and apart from the competence of those who have pronounced it; of that competence there cannot be the shadow of a doubt." Before the award the *Builder* said, "Decidedly the most conspicuous, or in some respects the most meritorious, set of drawings in the exhibition, is that which faces the entrance, and is marked with the motto 'Ad ogni uccello suo nido è bello.' It includes nine frames of drawings, got up and mounted with skill and taste. The perspective is sketched in brown ink, and tinted, with a masterly hand. The judges will decide whether it tallies with the instructions. No other competitor has addressed himself more completely to the question of the appropriation of the whole ground, extending from the situations indicated by the instructions as to be appropriated to the Natural History Museum and the Patent Museum (that is the east, skirted by Exhibition-road, to the western extremity, bounded by Prince Albert's-road). His view is taken from the south, making the Cromwell-road the boundary, that way, of a most effective group of buildings, as in the drawing, composed of a centre mass and for subordinate masses, the latter being one at each angle of the ground, and the central mass being crowned by a large dome and four smaller domes." The *Building News* said, 'Ad ogni uccello suo nido è bello.' Though by no means the chastest, this is perhaps the most effectively conceived renaissance design exhibited. It is symmetrical in plan and general arrangement, and is illustrated by a very taking perspective view, which no doubt will help to place it in the foremost ranks of the 'premiated.'" After the awards were made, the *Daily Telegraph* said, "That the choice should have fallen on Captain Fowke is nevertheless a fact in itself certain to surprise everybody. It has, if we are rightly informed, surprised the judges themselves beyond measure. Lord Elcho and Mr. Tite will assuredly not be accused of any occult favouritism; their previously formed opinion of the design for the International Exhibition is pretty generally known, and it is probable that views not more indulgent were taken by Mr. Fergusson and Mr. Pennethorne, if not by Mr. Roberts; yet here is Captain Fowke, of all men, chosen to furnish the design for national buildings at South Kensington, of all places!"

Paris Exhibition of 1867.—The *Belgian Moniteur* says that, in consequence of the accession of the Duke de Brabant to the Crown, Count de Flandre has accepted the Presidentship of the Belgian Commission for the Paris Exhibition.

Crossing the Channel.—The London correspondent of *Saunders's News Letter* states that a company is being formed to place on the Channel a line of steamers from Dover to Calais, so large that the railway trains shall run on board them, and there bodily remain to be run out again on the other side, when the passage is effected, and which, by the same magnitude, it is expected will ride over the waves without putting the passengers to the slightest inconvenience. The miseries hitherto inevitable to this passage have been chiefly entailed by the restriction to boats of a size proportioned to the shallowness of the water on either shore; but the new pier at Dover overcomes that objection on this side, and the French Goverment have (it is said) granted a concession for the requisite extension of that at Calais on the other.

Timber for Ship Building.—The French Government has given publicity to the following:—"There exists in the territory of Washington, in the United States of America, a channel formed by the waters of the Straits of Fuca, which penetrates a hundred and fifty miles into the country. This stream, known as Paget's Sound, is sprinkled with numerous islands, which contain forests of pine trees of the species so much in demand for ship-building. Amongst these islands is one called Lamano, on which the pines attain gigantic proportions. Some French vessels have already taken freights of timber from this neighbourhood. The ships sent to Paget's Sound for spars should be of not less than seven hundred tons capacity. The cargo may be completed with planks, small spars, and squared wood fit for railway sleepers. It is very important that, in order to save loss of time and money, the shipper should send notice from San Francisco to the timber merchants in the Sound, informing them when the vessels may be expected. The obtaining and shipping a cargo occupies about two months."

New Magnesia Light.—The Italian journals announce the discovery of a new artificial light, by Professor Carlevaris, of Genoa. The Carlevaris light is oxy-hydro-magnesian, and it is produced by the combustion of a salt of magnesia (not a costly substance), in a mixture of oxygen, either with pure hydrogen or with common gas. The light is described as white, rich in actinic rays, steady, and giving little heat. For photographic purposes it is said to be excellent. The light is said not to be affected by currents of air, and to be extremely cheap; a light equal to four composition candles is set down at two centimes, or less than a farthing per hour. An experiment was tried at the lighthouse of Genoa. The new light is reported to have proved superior to that of the ordinary lamps in use there, which represent twenty-three Carcel lamps, and to have cost not more than three-pence an hour.

Photographic Plans.—It is announced in Paris that the optician Chevalier has succeeded in arranging an apparatus for taking geometric plans by photography. The instrument is provided with a meridional telescope, and a compass in order to set it to any given point; a circular collodionised glass is placed horizontally at the bottom of a camera obscura, formed of copper, and moved by clock-work, so as to describe within a given time the entire circle of which the station chosen is the centre, and the various objects as they are received in turn by the lens are photographed on the circular plate through an extremely narrow slit in the side of the copper box. The operation is to be repeated at three stations in order to avoid error, and the result is said to be highly satisfactory. The three circular plates are then used to lay down on paper all the points of the plan described. The same instrument working vertically, instead of horizontally, serves also for levelling.

MEETINGS FOR THE ENSUING WEEK.

Mon. ... R. Geographical, 8½. M. P. B. Du Chaillu, "Second Journey into Western Equatorial Africa."
Medical, 8½. Lettsomian Lecture, by Dr. Anstie.
Odontological, 8. Annual Meeting.
Tues.... Medical and Chirurgical, 8½.
Civil Engineers, 8. Inaugural Address of Mr. John Fowler, President.
Zoological, 8½.
Syro-Egyptian, 7½. Mr. J. Bonomi, "The Pharaohs of the Bible."
Photographic, 8.
Ethnological, 8.
Wed.....Geological, 8.
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
R. Society of Literature, 4½.
Thurs.. Royal, 8½.
Antiquaries, 8½.
Royal Society Club, 6.
Fri...... Astronomical, 8.

Patents.

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From Commissioners of Patents Journal, December 29th.

Grants of Provisional Protection.

Aerial navigation—3283—W. Clark.
Air, deodorizing impure—3287—J. J. and E. Harrison.
Animal and vegetable substances, preserving—3172—A. V. Newton.
Atmospheric railways and carriages—3173—A. Doull.
Bed quilts, table, and toilet covers—3255—T. Jones and J. Buckley.
Bichloride of carbon and chloride of sulphur—3253—R. Ransford.
Billiards, adapting ordinary tables for playing—3186—H. S. Marshall.
Blasting powder—3206—A. Budenberg.
Bread, cutting—3251—H. C. Litchfield.
Buttons—3164—G. T. Bousfield.
Carriages, drag for—3227—A. E. Dobbs.
Carriage wheels, naves and axletree boxes of—3210—L. L. Sovereign.
Chimney cowl—3052—H. E. Newton.
Cigars or pipes, tray for—3102—R. A. Brooman.
Cloths. endless—2966—J. H. Whitehead.
Coal, retort for extracting products from—3285—J. Gibbon.
Coke ovens, utilizing the waste heat of—3048—W. E. Gedge.
Door mats, &c., made principally of india rubber—3216—G. Barber.
Driving belts, leather—3148—C. D. Hitchcock and J. Shimmon.
Electro-telegraphic purposes, wire conductors for—3180—W. Boggett.
Eucalyptus and myrtacean plants, preparation and application thereof as tobacco and snuff—3174—R. A. Brooman.
Felt hats—3281—W. E. Newton.
Fibrous substances, combing—3182—J. Warburton.
Fibrous substances, opening and cleaning—3233—T. R. Hetherington and S. Thornton.
Fire-arms, breech-loading—3178—T. Wilson.
Fire-arms, breech-loading—3249—J. Aston.
Fire escapes and builders' scaffolds, apparatus for—3128—E. Vagg.
Floating structures, mooring—3265—C. Liddell and R. S. Newall.
Foot protectors—3273—A. H. Thurgar.
Garments, buttons and studs for fastening—3160—F. Dahis.
Goods, &c., 'lifts' for raising—2900—J. Norris.
Grain, screening—3239—H. W. Miller.
Gun barrels, &c., metal tubes for—3289—T. Rickett.
Hay, apparatus for elevating—3198—E. L. Walker.
Horses, &c., apparatus for apportioning the fodder of—3237—J. Masson.
Hot-water dishes, &c.—3146—J. Parkes.
Indian rubber—2630—A. A. Lerenard.
Leather skins, splitting—3277—G. T. Bousfield.
Locomotive engines—3259—J. A. Longridge.
Materials, apparatus for mixing—3243—W. Robinson.
Motive power, turbines for obtaining—3222—W. Brookes.
Paper pulp—3245—W. A. West.
Photographic surfaces, preparing—3199—V. M. Griswold.
Pistons—3279—J. H. Johnson.
Pulleys—3231—W. Winter.
Pyrotechnic toy—3195—T. King.
Railroads, permanent way of—3168—H. A. Bonneville.
Railway bars, &c.—3084—T. W. Dodds.
Railway bars—3224—J. Sanderson.
Railway steam engines and carriages—2928—J. A. Loubat.
Railway trains, signalling on—3291—M. Siégrist.
Railway wheels, tyres for—3158—R. E. Price.
Rivets, finishing—3200—H. K. York.
Rock, boring—3218—F. B. Dœring.
Screwing and tapping machine—3166—E. Watteeu.
Seamen's hats—3241—J. Lancaster.
Sewage, utilization of—2626—J. Linton.
Sheep ointment—3208—C. K. Tomlinson and C. J. Hayward.
Ships, protecting the bottoms and sides of—3000—C. P. Coles.
Shutters, folding—3194—J. Goddard.
Slate, &c., cutting or getting—3297—W. F. Cooke and G. Hunter.
Spinning, preparing grasses for—3156—O. Maggs and G. H. Smith.
Steam, boiler for generating—3235—J. C. Wilson.
Steam, cooking by—3162—G. T. Bousfield.
Steam, generating—3269—R. A. Brooman.
Steam power, cultivating land by—3226—P. W. Bowen.
Sulphur—2993—A. C. St. P. de Sincay.
Swings—3229—C. P. Button.
Truss—3202—C. Easby.
Tubes, tool for cutting—3214—A. V. Newton.
Water closet—2912—P. Ellis.
Weaving, looms for—3152—J. Woollatt.
Weaving, utilizing waste healds for—3257—F. Johnston and W. Astley.
Winding machinery—3116—J. J. Ashworth.
Wood, tools for cutting—3188—W. W. Hulse.

Inventions with Complete Specifications Filed.

Railways, permanent way and wheels of—3322—H. A. Dufrene.
Steel and purified iron—3300—H. A. Bonneville.

Patents Sealed.

1739. F. Delamare-Deboutteville.
1742. R. A. Brooman.
1743. J. Keighley.
1746. L. Faure.
1747. G. Davies.
1754. C. de Bergue.
1758. G. and D. Hurn.
1764. W. Clapperton and A. Lyle.
1774. W. S. Parfitt.
1775. J. and A. Longbottom.
1793. J. M. Macrum.
1802. J. Hopkinson and J. Whitelock.
1979. A. V. Newton.
1980. A. V. Newton.
2065. A. Budenberg.
2405. W. Watkin.
2534. C. J. Tinker.

From Commissioners of Patents Journal, January 2nd.

Patents Sealed.

1757. S. Bates.
1761. L. H. G. Ehrhardt.
1766. J. and R. S. Dale.
1770. R. A. Brooman.
1771. W. E. Gedge.
1779. H. Emanuel.
1783. J. H. Smith.
1791. J. W. Swan.
1794. P. M. C. Beziel.
1795. A. F. Morelle.
1796. E. H. Waldenstrom.
1799. H. D. P. Cunningham.
1800. T. F. Henley.
1801. F. A. Wilson.
1803. J. Bullough.
1804. J. George.
1806. W. Goulding.
1807. G. Fentiman.
1809. I. Baggs.
1810. W. E. Newton.
1812. J. F. Heather.
1817. C. O. Papengouth.
1822. D. Cowan.
1855. A. E. Molin.
1902. J. Walton.
1924. J. Rigg.
1957. W. E. Newton.
2040. A. Millochau.
2098. W. Bunger.
2185. G. W. Howard.
2196. F. A. E. G. de Massas.
2265. S. Chatwood.
2344. J. P. Woodbury.
2380. G. A. Keene.
2671. T. McGrah.

Patents on which the Stamp Duty of £50 has been Paid.

24. E. Skull and E. Mealing.
30. W. E. Newton.
41. W. E. Newton.
3472. J. H. Johnson.
3477. J. E. Carter.
3481. R. Bottomley.
8. J. Jones.
9. W. Shutter.
34. J. Howard and J. Bullough.